

What is claimed is:

1. An image display device, comprising:

a display panel which has a plurality of pixel
sections each of which includes at least a pixel displaying
5 an image for the first viewpoint and a pixel displaying an
image for the second viewpoint, said pixel sections being
provided periodically in one direction; and

an optical unit refracts the light emitted from said
pixels and emits the light in directions different from each
10 other, and

a fixing unit which is provide on at least a part of
an area enclosing an image display area of said display
panel, said fixing unit fixes said optical unit to said
display panel.

15 2. An image display device according to claim 1,
wherein said optical unit is a lenticular lens having a
plurality of semicylindrical lenses, longitudinal direction
of which is perpendicular to said one direction, or a fly-
eye lens having a plurality of convex lenses in which a lens
20 pitch in said one direction and the lens pitch in a
direction perpendicular to said one direction are different
from each other, and said fixing unit is provided along a
side extending in a longitudinal direction of said convex
lens or the longitudinal direction of said semicylindrical
25 lens in said optical unit.

3. An image display device according to claim 1,
wherein said optical unit is a lenticular lens having a
plurality of semicylindrical lenses, longitudinal direction

of which is perpendicular to said one direction, or a fly-eye lens having a plurality of convex lenses in which a lens pitch in said one direction and the lens pitch in a direction perpendicular to said one direction are different from each other, and said fixing unit is provided along the side extending in a direction orthogonal to a longitudinal direction of said convex lens or the longitudinal direction of said semicylindrical lens in said optical unit.

4. A three-dimensional image display device according to claim 1, wherein said optical unit is the fly-eye lens having a plurality of convex lenses in which a lens pitch in said one direction and the lens pitch in a direction perpendicular to said one direction are equal to each other, and said fixing unit is provided along a short side of said optical unit.

5. An image display device according to claim 1, wherein said optical unit is the fly-eye lens having a plurality of convex lenses in which a lens pitch in said one direction and the lens pitch in a direction perpendicular to said one direction are equal to each other, and said fixing unit is provided along the side orthogonal to the short side of said optical unit.

6. An image display device according to claim 1, wherein said fixing unit is provided so as to enclose the image display area in said display panel.

7. An image display device according to claim 1, wherein said fixing unit is an adhesive.

8. An image display device according to claim 1,

wherein said fixing unit is a double-sided adhesive tape.

9. An image display device according to claim 1,
further comprising one or a plurality of aligning units that
align said optical unit and said display panel when said
5 optical unit is fixed to said display panel, in at least one
of said optical unit and said display panel.

10. An image display device according to claim 1,
wherein said optical unit, which a plurality of convex
lenses are formed on one side and the other side is a plane
10 surface, is arranged so that said convex lenses faces on the
side of said viewer.

11. An image display device according to claim 1,
wherein said optical unit, which a plurality of convex
lenses are formed on one side and the other side is a plane
15 surface, is arranged so that said convex lenses faces on the
side of said display panel.

12. An image display device according to claim 1,
further comprising an optical film, arranged between the
image display area of said display panel and said optical
20 unit, for holding a spacing between said display panel and
said optical unit.

13. An image display device according to claim 1,
wherein said optical unit is a lenticular lens having a
plurality of cylindrical lenses whose longitudinal direction
25 is a longitudinal direction of said image display device.

14. An image display device according to claim 1,
wherein said optical unit is a lenticular lens having a
plurality of cylindrical lenses whose longitudinal direction

is a lateral direction of said image display device.

15. An image display device according to claim 2,
wherein said fixing unit is provided along the side
extending in a direction orthogonal to the longitudinal
5 direction of said convex lens or the longitudinal direction
of said semicylindrical lens in said optical unit.

16. An image display device according to claim 4,
wherein said fixing unit is provided along the side
orthogonal to the short side of said optical unit.

10 17. An image display device according to claim 6,
wherein a space which is formed by said optical unit, said
display panel, and said fixing unit is negative pressure
than ambient atmosphere.

18. An image display device according to claim 7,
15 wherein said adhesive is a photo-setting adhesive which is
cured by visible light.

19. An image display device according to claim 7,
wherein said adhesive contains fillers.

20. An image display device according to claim 9,
20 wherein said aligning unit is provided at a position
corresponding to each of four corners of said display panel.

21. An image display device according to claim 9,
wherein a plurality of convex lenses are formed on one side
of said optical unit, and said aligning unit is provided in
25 an area where said convex lenses is not formed.

22. An image display device according to claim 9,
wherein said aligning unit is provided on a surface of said
optical unit on a side of said display panel.

23. An image display device according to claim 9, wherein an image display surface in said display panel includes a transparent substrate, and said aligning unit is provided on the surface of said transparent substrate.

5 24. An image display device according to claim 12, further comprising gap-holding members, arranged between said optical unit and said optical film, for holding the spacing between said optical unit and said optical film.

25. An image display device according to claim 23,
10 wherein a slit-shaped opening or a pinhole-shaped opening is provided in said aligning unit.

26. A method of manufacturing a three-dimensional image display device includes,

 a display panel which has a plurality of pixel
15 sections each of which includes at least a pixel displaying an image for the first viewpoint and a pixel displaying an image for the second viewpoint, said pixel sections being provided periodically in one direction, and

 an optical unit refracts the light emitted from said
20 pixels and emits the light in directions different from each other,

 comprising the steps of:

 forming fixing means including a liquid adhesive in an area which encloses an image display area of said display
25 panel or in at least a part of the area corresponding to the area which encloses the image display area of said display panel in said optical unit;

 arranging said optical unit on said display panel;

aligning said optical unit and said display panel by one or a plurality of aligning means which are formed in at least one of said optical unit and said display panel; and

fixing said optical unit to said display panel by
5 curing said adhesive.

27. A method of manufacturing a three-dimensional image display device according to claim 26, wherein said fixing unit is a photo-setting adhesive which is cured by irradiating said fixing unit with visible light, and curing
10 of said adhesive is performed by irradiating said fixing unit with the visible light.

28. A method of manufacturing a three-dimensional image display device according to claim 26, wherein said fixing unit is provided so as to enclose the image display
15 area in said display panel, and, in the step of providing an opening in a part of said fixing unit to fix said optical unit to said display panel, a space which is formed by said optical unit, said display panel, and said fixing unit is shielded from ambient atmosphere by sealing said opening
20 after fixing said optical unit to said display panel.

29. A method of manufacturing a three-dimensional image display device according to claim 26, wherein the plurality of aligning unit including a slit-shaped opening or a pinhole-shaped opening are provided in said display
25 panel, and the alignment is performed by irradiating said each opening with a light having a wavelength different from one another.

30. A method of manufacturing a three-dimensional

image display device according to claim 26, wherein the plurality of aligning unit including the slit-shaped opening or the pinhole-shaped opening are provided in said display panel, and the alignment is performed by irradiating said opening with the light to observe a position where the light which have passed through each opening are transmitted through said optical unit to cross each other.

31. A method of manufacturing a three-dimensional image display device according to claim 26, wherein said optical unit is a lenticular lens having a plurality of semicylindrical lenses, longitudinal direction of which is perpendicular to said one direction, and the alignment is performed by using a line source of light extending in the longitudinal direction of said semicylindrical lens in said lenticular lens.

32. A method of manufacturing a three-dimensional image display device according to claim 26, wherein said optical unit is the lenticular lens having a plurality of semicylindrical lenses, longitudinal direction of which is perpendicular to said one direction, and the alignment is performed only in a direction orthogonal to the longitudinal direction of said semicylindrical lens in said lenticular lens by said aligning unit.

33. A method of manufacturing a three-dimensional image display device according to claim 26, wherein the step of fixing said optical unit to said display panel is performed under reduced pressure.

34. A method of manufacturing a three-dimensional

image display device according to claim 28, wherein said opening is sealed while the space which is formed by said optical unit, said display panel, and said fixing unit is set to negative pressure than the ambient pressure.

5 35. A method of manufacturing a three-dimensional image display device includes,

 a display panel which has a plurality of pixel sections each of which includes at least a pixel displaying an image for the first viewpoint and a pixel displaying an
10 image for the second viewpoint, said pixel sections being provided periodically in one direction, and

 an optical unit has a plurality of convex lenses that refracts the light emitted from said pixels and emits the light in directions different from each other,

15 comprising the steps of:

 forming fixing means including an adhesive material in an area which encloses an image display area of said display panel or in at least a part of the area
corresponding to the area which encloses the image display
20 area of said display panel in said optical unit; and

 arranging said optical unit on said display panel to fix said optical unit to said display panel by curing said adhesive material, while said optical unit and said display panel are aligned with each other by one or a plurality of
25 aligning means which are formed in at least one of said optical unit and said display panel.

 36. A method of manufacturing a three-dimensional image display device according to claim 35, wherein said

fixing unit is provided so as to enclose the image display area in said display panel, and, in the step of providing an opening in a part of said fixing unit to fix said optical unit to said display panel, a space which is formed by said optical unit, said display panel, and said fixing unit is shielded from ambient atmosphere by sealing said opening after fixing said optical unit to said display panel.

37. A method of manufacturing a three-dimensional image display device according to claim 35, wherein the plurality of aligning unit including a slit-shaped opening or a pinhole-shaped opening are provided in said display panel, and the alignment is performed by irradiating said each opening with a light having a wavelength different from one another.

38. A method of manufacturing a three-dimensional image display device according to claim 35, wherein the plurality of aligning unit including the slit-shaped opening or the pinhole-shaped opening are provided in said display panel, and the alignment is performed by irradiating said opening with the light to observe a position where the light which have passed through each opening are transmitted through said optical unit to cross each other.

39. A method of manufacturing a three-dimensional image display device according to claim 35, wherein said optical unit is a lenticular lens having a plurality of semicylindrical lenses, longitudinal direction of which is perpendicular to said one direction, and the alignment is performed by using a line source of light extending in the

longitudinal direction of said semicylindrical lens in said lenticular lens.

40. A method of manufacturing a three-dimensional image display device according to claim 35, wherein said
5 optical unit is the lenticular lens having a plurality of semicylindrical lenses, longitudinal direction of which is perpendicular to said one direction, and the alignment is performed only in a direction orthogonal to the longitudinal direction of said semicylindrical lens in said lenticular
10 lens by said aligning unit.

41. A method of manufacturing a three-dimensional image display device according to claim 35, wherein the step of fixing said optical unit to said display panel is performed under reduced pressure.

15 42. A method of manufacturing a three-dimensional image display device according to claim 36, wherein said opening is sealed while the space which is formed by said optical unit, said display panel, and said fixing unit is set to negative pressure than the ambient pressure.